

POWER STEERING

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GENERAL DESCRIPTION

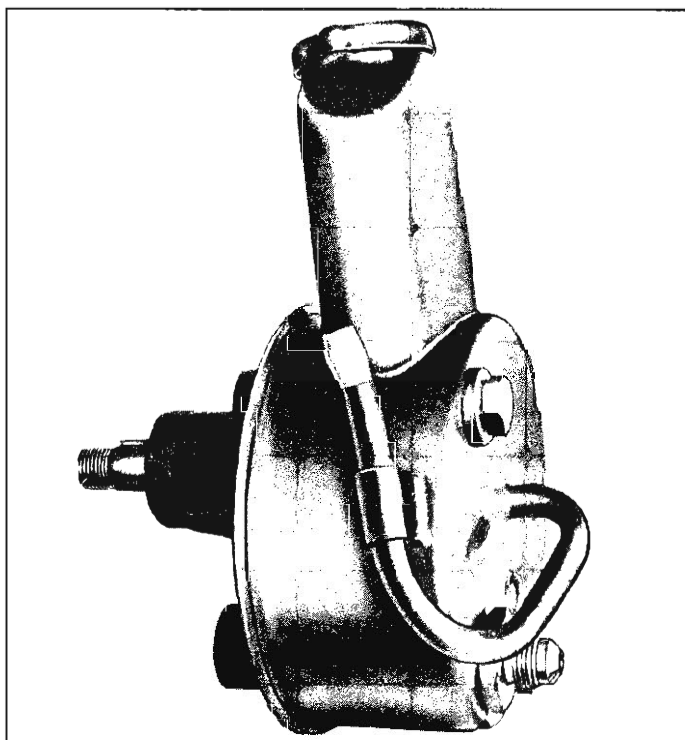


Fig. 59—Power Steering Pump

The 1961 power steering incorporates several improvements over previous models. The pump return line has been relocated and a new filter is provided for returned fluid. A flow control valve modification allows the new pump to deliver somewhat higher pressures than last year's original model (fig. 59).

The power cylinder and valve assembly are of proven design with modification found only in the power cylinder mounting. The steering gear is a 20:1 ratio unit.

MAINTENANCE AND ADJUSTMENTS

Bleeding Hydraulic System

1. Fill oil reservoir to proper level and let oil remain undisturbed for at least two minutes.
2. Start engine and run only for about two seconds.
3. Add oil if necessary.
4. Repeat above procedure until oil level remains constant after running engine.
5. Raise front end of vehicle so that wheels are off the ground.
6. Increase engine speed to approximately 1500 RPM.
7. Turn the wheels (off ground) right and left, **lightly** contacting the wheel stops.
8. Add oil if necessary.
9. Lower the car and turn wheels right and left on the ground.
10. Check oil level and refill as required.
11. If oil is extremely foamy, allow vehicle to stand a few minutes with engine off and repeat above procedure.
 - a. Check belt tightness and check for a bent or loose pulley. (Pulley should not wobble with engine running.)
 - b. Check to make sure hoses are not touching any other parts of the car, particularly sheet metal.
 - c. Check oil level, filling to proper level if necessary, following operations 1 through 10. **This step and step "D" are extremely important as low oil level and/or air in the oil are the most frequent causes of objectionable pump noise.**
 - d. Check the presence of air in the oil. Air will show up as a milky appearing oil. If air is present, attempt to bleed system as described in operations 1 through 10. If it becomes obvious that the pump will not bleed after a few trials, proceed as outlined under *Power Steering Pump Checks—1. Pump Noise.*

Fluid Level

1. Check oil level in the reservoir by checking the dip stick when oil is hot.
2. Fill, if necessary, to proper level with Automatic transmission fluid "Type A" bearing an "AQ-ATF" mark. This oil is the same as used in the Powerglide Transmission.

Pump Belt Tension

Adjustment

1. Loosen power steering bracket to power steering pump attaching bolts (fig. 60).

CAUTION: Do not move pump by prying against reservoir or by pulling on filler neck.

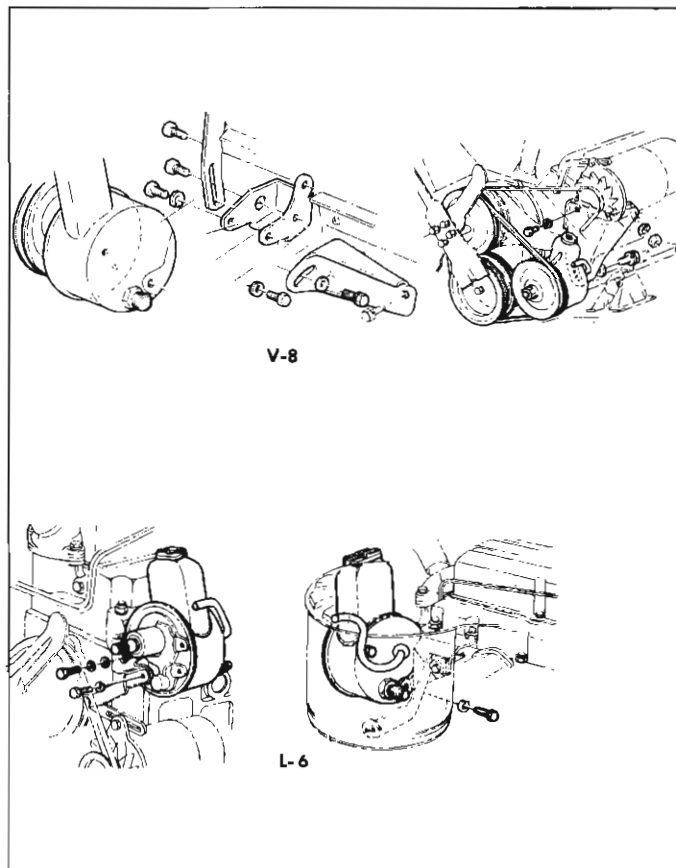


Fig. 60—Pump Mounting

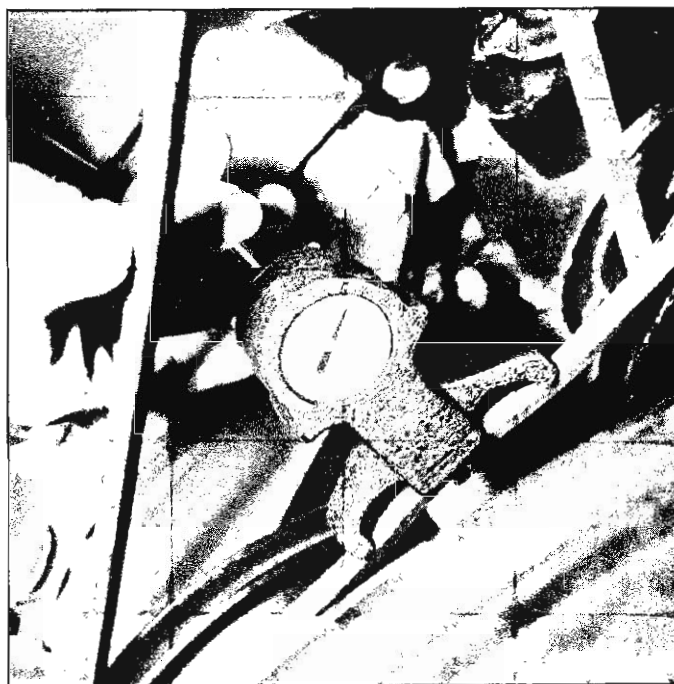


Fig. 61—Checking Belt Tension with Tool J-7316

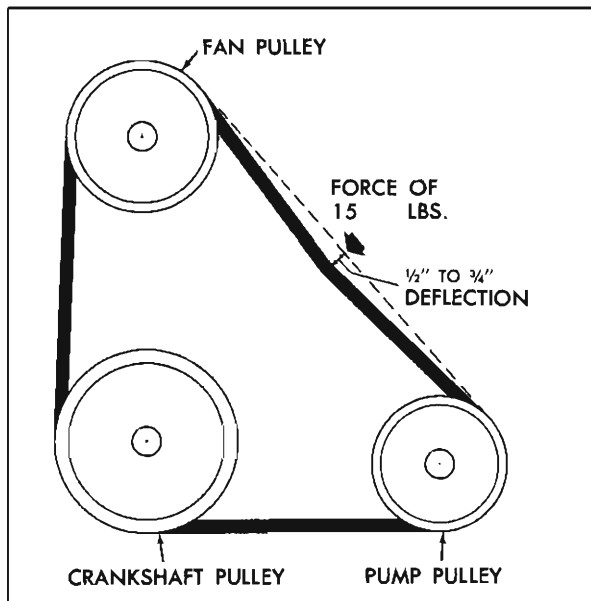


Fig. 62—Checking Belt Tension by Deflection

2. Move pump, with belt in place, until belt is tensioned to 75 lbs. strand tension for new belts, and 50 lbs. strand tension for old, as indicated by Tool J-7316 (fig. 61), or so that 15 lbs. of force applied at the midpoint between the power steering pump pulley will cause $\frac{1}{2}$ " to $\frac{3}{4}$ " belt deflection (fig. 62).
3. Tighten pump mounting bolts.

CAUTION: When replacing the power steering belt or the generator belt be sure to use the proper length belt. Use of an improper length belt in either case could cause serious interference between the power steering pump and the generator belt.

Pump Checks

1. Pump Noise

The power steering pump is not completely noiseless. Some noise will be present at standstill parking. Particularly when the wheels are against the wheel stops. Power steering pump noise can be confused with many other things such as transmission, rear axle, generator, etc. If it is determined that excessive noise is present, remove the pump drive belt, determining for sure if the pump is at fault. If it is determined that excessive pump noise is present, the following steps should be taken in order given:

- a. Check belt tightness and pulley condition.
- b. Check oil level, filling to proper level if necessary.
- c. Check to make sure hoses are not touching any other part of the car, particularly sheet metal.
- d. Check the presence of air in the oil. Air will show up as bubbles or the oil will appear milky. Small amounts of air may cause extremely noisy operation. If air is present:

1. Tighten all fittings and bolts.
2. Check the entire system for source of air leak. Air leaks usually occur at joints in the system where oil passes through at high velocity such as hose connections or at the drive shaft seal. After each step in attempting to eliminate air, perform Bleeding Operations 1 through 10 outlined under Maintenance and Adjustments.
- e. If after Step d there is no air present, install pressure gage in the pressure line between the pump and control valve. If when racing the engine to about 1000 rpm and without turning the steering wheel, the pressure exceeds 125 psi, the hoses and/or control valve are restricting the oil flow and these parts should be examined to determine the cause of restriction.
- f. If the pressure in Step e is less than 125 psi, it will be necessary to remove the pump from the car and disassemble, or partially disassemble, following the steps outlined under pump disassembly.
- g. Check the pressure plate for scoring.

NOTE: A high polish is always present on the face as a result of normal wear. Do not confuse this with scoring. Light scoring can be cleaned up by carefully lapping on a flat surface. Be sure to thoroughly wash away all lapping compound.

- h. Check the vanes to insure that the radius edge is toward the outside and that they operate freely in the rotor slots.
- j. Check the contour surface of the pump ring for extreme wear. Normally there may be some scuff marks and uniform wear. This is not detrimental to pump noise or function. However, if the wear consists of chatter marks or gouges that can be felt with the finger, both the ring and vanes should be replaced. The vanes should be replaced also because if the ring is worn sufficiently to be felt with the finger, the vanes usually are worn out quite badly too.
- k. Check the face of the thrust plate for scoring. Light scoring or pick-up can be cleaned up by lapping (See 'g' above).
- m. Check the pump shaft and bushing. Excessive wear may cause noisy operation.
- n. Cases of pump noise caused by the flow control plunger have been known to exist. If other measures fail, try a new plunger and spring.

2. Pump Leaks

- a. Tighten all fittings and bolts.
- b. Try to determine source of leak by wiping off pump assembly.
- c. Possible sources of pump leakage are as follows:

3. Poor, or No Assist, or Pump Inoperative

- a. Check for loose drive belt.
- b. Check and fill reservoir, bleed system as outlined under Maintenance and Adjustments.

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- c. Determine the source of trouble; that is, pump, control valve or hoses. Install pressure gauge in the pressure line between the pump and valve.

Test No. 1—Oil Circuit Open:

1. Install a pressure gauge in the pressure line between the pump and control valve. Be sure to check and identify the pressure lines.
2. Turn the steering wheel from one end to the other end and note the pressure on the gauge while holding the wheel momentarily against each end. This maximum pressure reading should fall between 850 psi and 1000 psi with the pump idling at 480 rpm and the oil temperature in the reservoir between 150° and 170°. To obtain temperatures of 150 degrees to 170 degrees desired for testing, turn wheels through normal operating range several times.

CAUTION: Do not hold the steering wheel against the stop for any extended period of time. Do not "flat spot" tires by excessive turning in one spot.

If the maximum pressure is below 850 psi, it indicates there is some trouble in the hydraulic circuit. However, it does not indicate whether the pump or the control valve is at fault. To determine if the pump alone or the control valve alone, or if both, are at fault, proceed with Test No. 2.

Test No. 2—Oil Circuit Closed:

1. Set pump idle at 450 rpm.

2. Turn the shut-off valve of gauge to the closed position.

NOTE: Shut-off valve must be located between the gauge and the control valve.

3. Observe and compare the maximum pump pressure at idle. It should not be less than 850 psi.

NOTE: By comparing this reading with Test No. 1 (Testing Complete Circuit), it is possible to determine whether the fault is with the pump or control valve or both.

Diagnosing Results of Above Tests:

1. First test below 850 psi, second test 850 psi to 1000 psi—the control valve is at fault.
 2. First test below 850 psi, second test not more than 50 psi greater—the pump is at fault.
- d. If pump is determined to be at fault, proceed as follows:
1. Replace flow control valve assembly, being careful to clean out bore and keep dirt out.
 2. Insure that the pressure plate is flat against the pump ring. Press down as described under Step 7 of Pump Assembly.
 3. Check the pressure plate, thrust plate, rotor and ring for scoring as described under "Pump Noise."
 4. Check the vanes as described under "Pump Noise."
- e. If control valve is at fault, see control valve service information.

SOURCE OF LEAK	CAUSE	REMEDY
Top of Reservoir	Reservoir Too Full Excessive Air Present in Oil Housing Welsh Plug Loose or Missing	Fill to Proper Level Proceed as in 1-d Above to De- termine Cause of Air Replace Plug
At Reservoir	O-Ring Cut or Improperly Installed Reservoir Damaged	Replace O-Ring or Install Properly Replace Reservoir
At the Pressure Fitting or Studs	Not Tightened Sufficiently Cross Threaded or Defective Seal on Fittings or Hose or Damaged Seals	Torque to 20 Foot-Pounds Correct as Necessary
At Shaft Seal	Defective Seal or Damaged Shaft	Replace Seal. Replace Shaft if Seal Surface is Scratched or Nicked
Leaks in Metal Parts	Defective Castings	Replace

SERVICE OPERATIONS

POWER STEERING PUMP

Removal From Vehicle (Fig. 60)

1. Disconnect hoses at pump. When hoses are disconnected, secure ends in raised position to prevent drainage of oil. Cap or tape the ends of the hoses to prevent entrance of dirt.
2. Install two caps at pump fittings to prevent drainage of oil from pump.
3. Loosen bracket-to-pump mounting nuts.
4. Remove pump belt.
5. Remove bracket-to-pump bolts and remove pump from vehicle.
6. Remove drive pulley attaching nut.
7. Slide pulley from shaft. **Do not hammer** pulley off shaft as this will damage the pump.

Disassembly

Clean Outside of Pump Before Disassembly

1. Remove union and seal.
CAUTION: In clamping pump in vise, be careful not to exert excessive force on front hub of pump as this may distort the bushing.
2. Remove pump reservoir retaining bolt on L-6 engines.
3. Remove reservoir from housing by turning counterclockwise until reservoir can be lifted freely from housing (approx. 30°).
4. Remove mounting bolt "O" rings and union "O" rings.
5. Remove filter and filter cage; discard filter element after checking for metal particles.
6. Remove end plate retaining ring. Depress end plate retaining ring using $\frac{1}{8}$ diameter hole in

pump housing. When ring is in depressed position, remove as shown with screwdriver (fig. 63).

7. Remove end plate. End plate is spring-loaded and will generally sit above the housing level. If sticking should occur, a slight rocking action or light tapping with hammer will free the plate.
8. With pump in vise, remove shaft woodruff key and tap end of shaft gently with soft hammer until pressure plate, pump ring, rotor assembly and thrust plate may be removed as a unit (fig. 64).

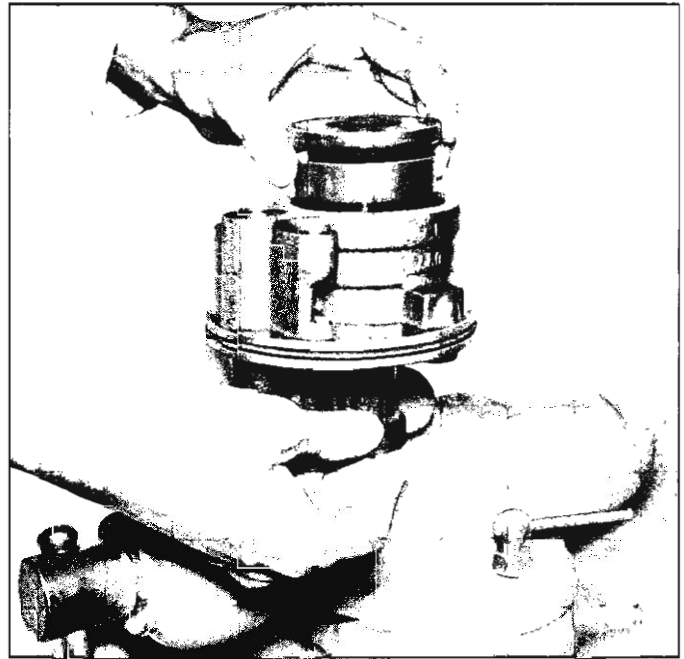


Fig. 64—Impeller Unit Removal

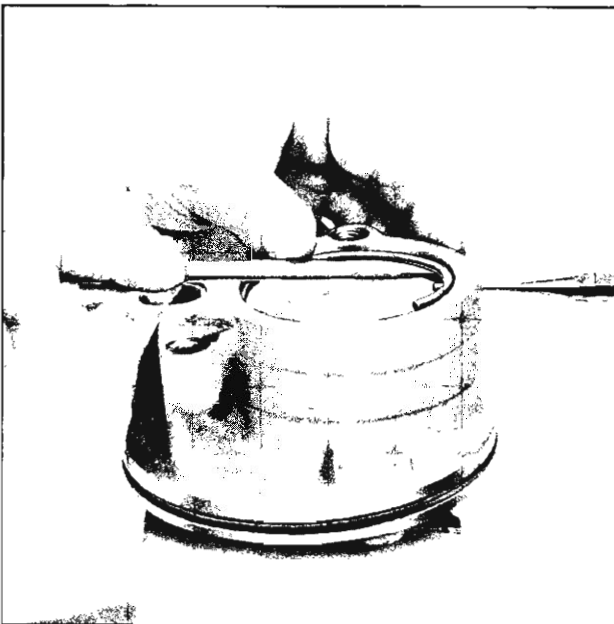


Fig. 63—Removing End Plate Ring

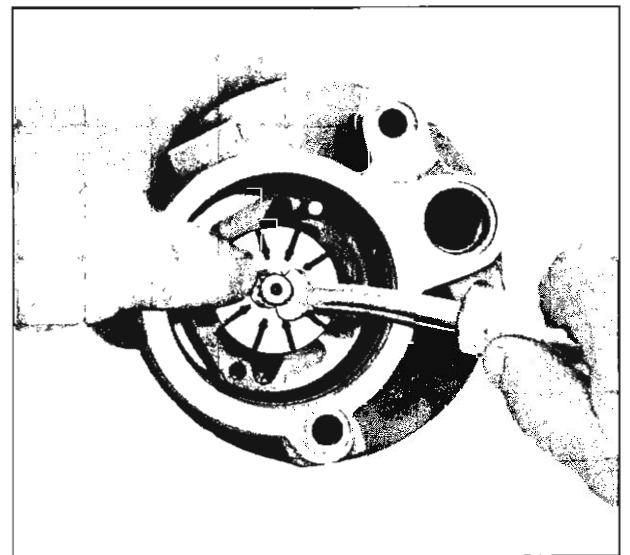


Fig. 65—Removing Pump Shaft Snap Ring

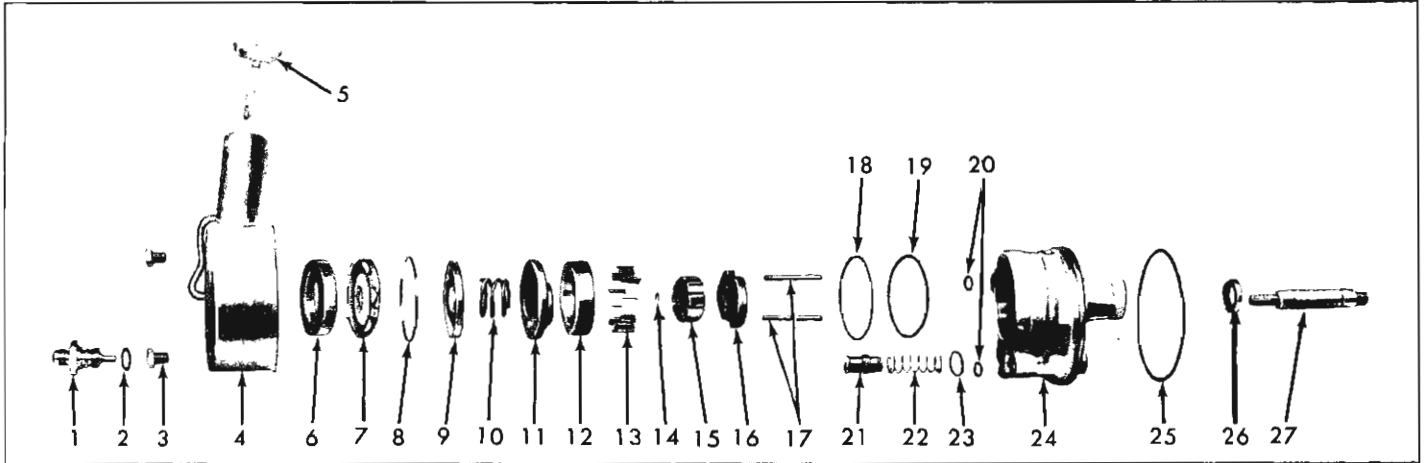


Fig. 66—Exploded View of Pump

- | | | | |
|-----------------------------|--------------------------------|----------------------------------|--------------------------------------|
| 1. Union | 9. End Plate | 15. Rotor | 22. Flow Control Valve Spring |
| 2. Seal | 10. Spring | 16. Thrust Plate | 23. Flow Control Valve "O" Ring Seal |
| 3. Mounting Bolts | 11. Pressure Plate | 17. Dowel Pins | 24. Pump Housing |
| 4. Reservoir | 12. Pump Ring | 18. End Plate "O" Ring | 25. Reservoir "O" Ring Seal |
| 5. Filter | 13. Vanes | 19. Pressure Plate "O" Ring | 26. Shaft Seal |
| 6. Cage Assy. | 14. Drive Shaft Retaining Ring | 20. Mounting Bolt "O" Ring Seals | 27. Shaft |
| 7. Dip Stick and Cover | | 21. Flow Control Valve | |
| 8. End Plate Retaining Ring | | | |

9. Remove end plate "O" ring.
10. Separate the parts removed in operation 8. If inspection shows shaft to be defective, separate it from rotor by removing snap ring as shown in Figure 4-65.

Cleaning

Carefully clean all parts except O-ring seals which are to be replaced and should not be immersed in cleaning solvent. Lubricate all O-ring seals and the drive shaft seal with petroleum jelly and install in proper location. Be sure not to immerse the drive shaft seal in the cleaning solvent as this could damage it. Figure 66 shows an exploded view of the pump.

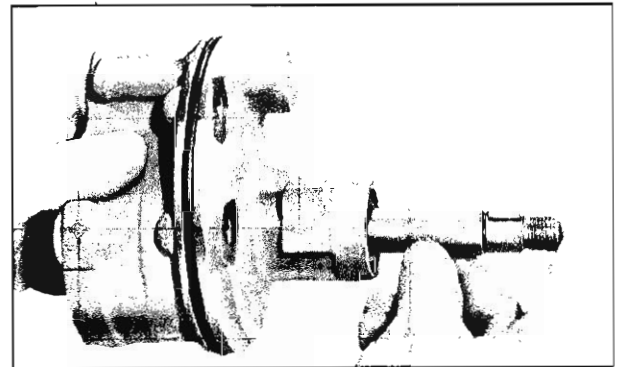


Fig. 68—Shaft Installation

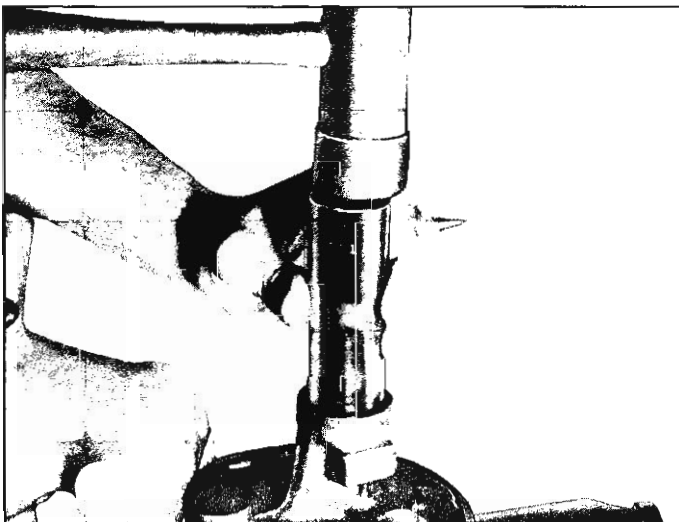


Fig. 67—Installing Seal Using Tool J-8818

Assembly

Be sure all parts are clean during re-assembly.

1. Install new shaft seal, using Tool J-8818 as shown in figure 67 and insert shaft at hub end of housing, spline end entering mounting face side (fig. 68).
2. Install thrust plate on dowel pins with ported face to rear of pump housing (fig. 69).
3. Install rotor, which must be free on splines, on pump shaft over splined end.

NOTE: Assemble rotor with countersunk side toward shaft.

4. Using suitable tool, install shaft retaining ring (fig. 70).
5. Install pump ring on dowel pins with direction of rotation arrow to the rear of the pump housing (fig. 71). Rotation is clockwise as viewed from pulley.

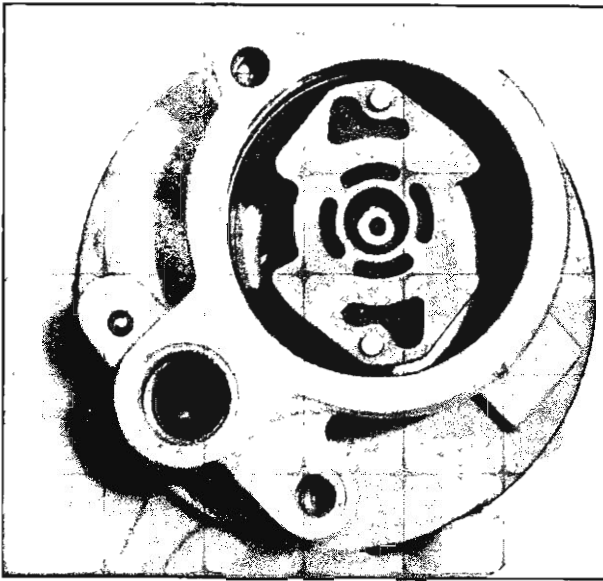


Fig. 69—Installing Thrust Plate

6. Install vanes in rotor slots with radius edge towards outside as shown in Figures 72 and 73.
7. Lubricate outside diameter and chamfer of pressure plate with petroleum jelly to insure against damaging O-ring and install on dowel pins with ported face toward the pump ring. Seat pressure plate by placing large socket on top of plate and pushing down with hand. (Pressure plate will travel about $\frac{1}{16}$ " to seat).
8. Install pressure plate spring in center groove of pressure plate (fig. 74).
9. Install end plate "O" ring.
10. Lubricate outside diameter and chamfer of end plate with petroleum jelly to insure against damaging "O" ring and install in housing using an arbor press as shown in Figure 75.
11. Install end plate retaining ring while pump is in arbor press. Be sure it is completely seated in the groove of the housing and that ring gap is in posi-

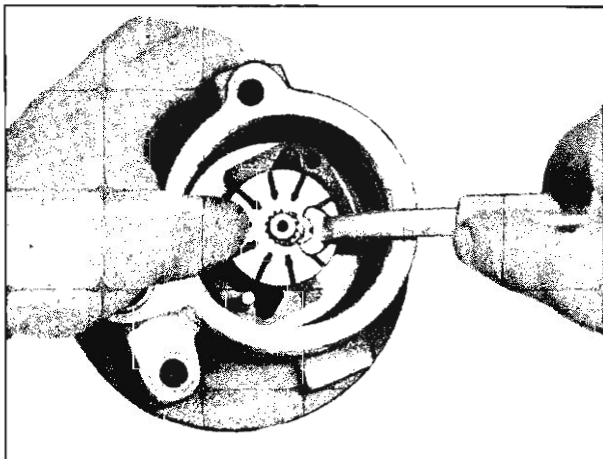


Fig. 70—Installing Shaft Snap Ring

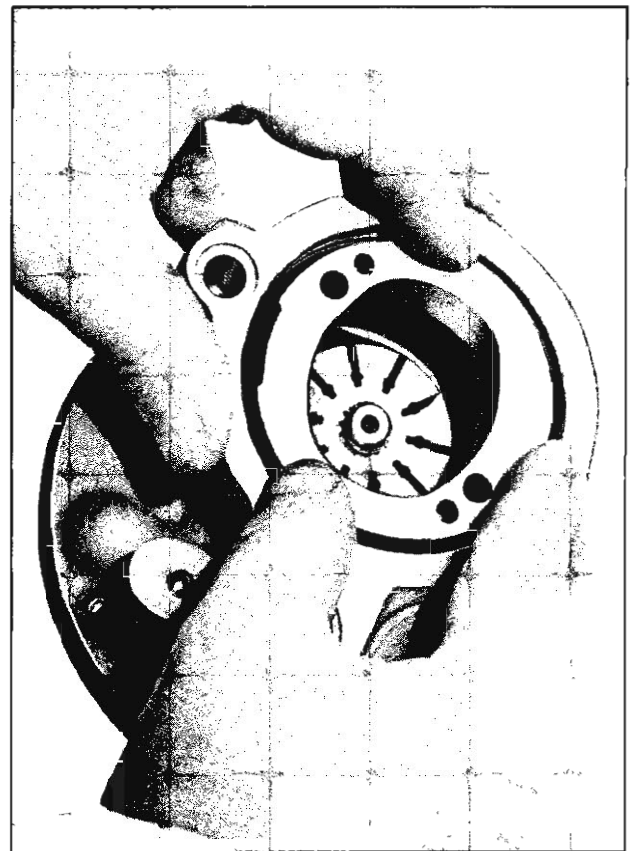


Fig. 71—Installing Pump Ring

- tion shown in Figure 75.
12. Install flow control spring and flow control plunger. Be sure hex head screw goes into bore first (fig. 76). Install filter cage and new filter.
13. Position reservoir so that filler tube is 30° counterclockwise of normal position, drop into place, then rotate clockwise to normal position and press down until reservoir seats on housing.

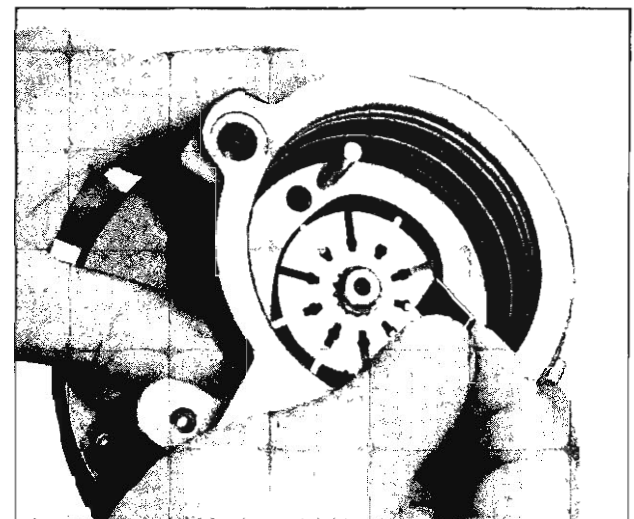


Fig. 72—Installing Vanes

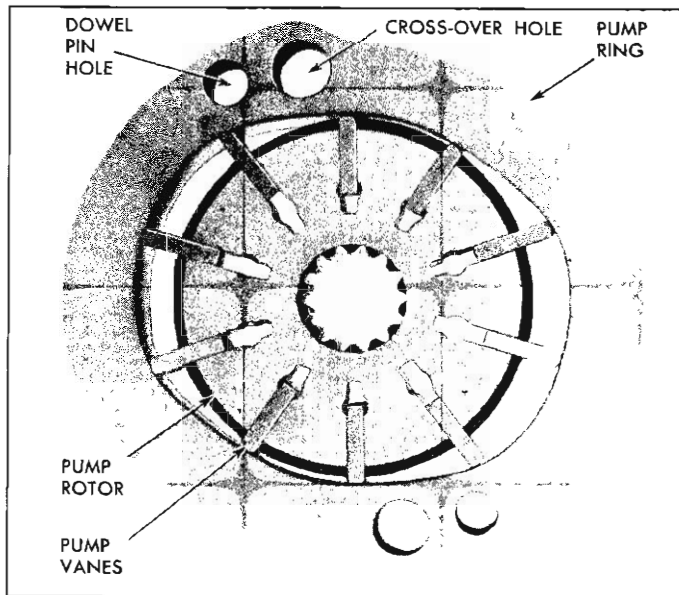


Fig. 73—Correct Vane Assembly

14. Install stud seals, union seal, union, and drive shaft woodruff key. Support the shaft on the opposite side of key when installing key.

NOTE: Reservoir must be seated before bolts are installed.

Installation on Vehicle

1. Slide pulley on shaft. **Do not hammer pulley.**
2. Install pulley nut and torque to 35-45 ft. lbs. against pulley.

NOTE: Always use a new pulley nut.

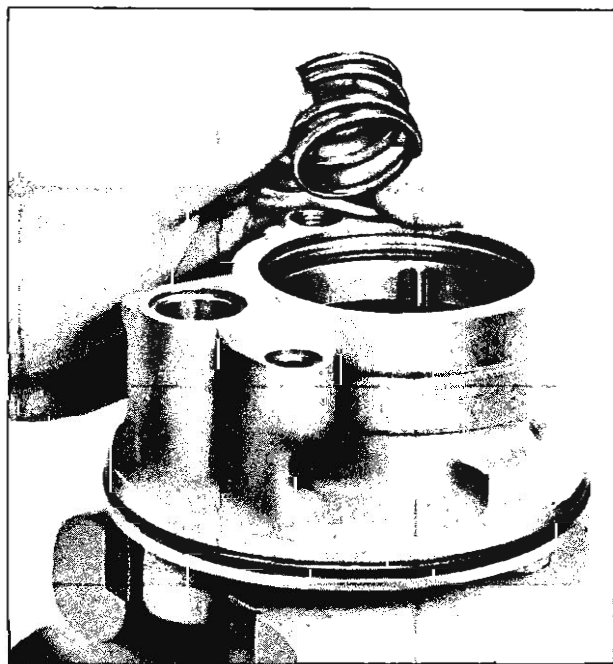


Fig. 74—Installing Pressure Plate Spring

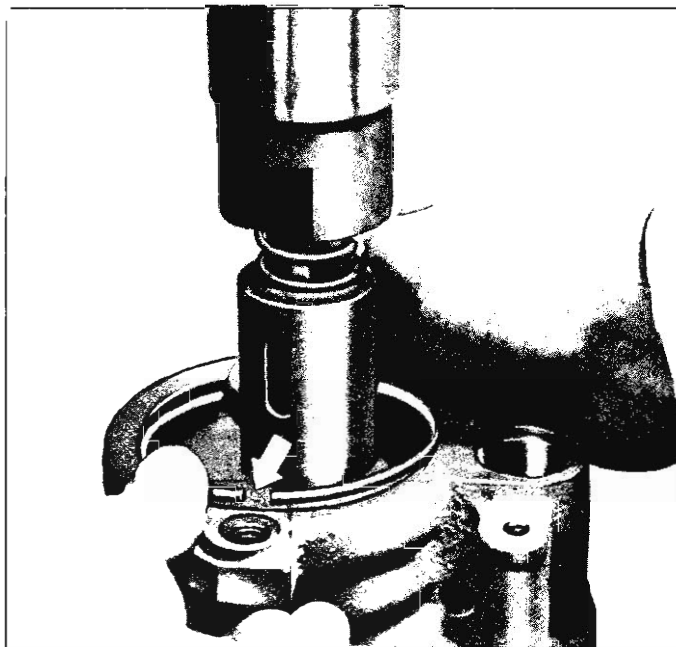


Fig. 75—Installing End Plate Retaining Ring

3. Position pump assembly on mounting bracket (fig. 60) with holes lined up and install bolts loosely.
4. Connect and tighten hose fittings.
5. Fill reservoir. Bleed pump by turning pulley backward (counterclockwise as viewed from front) until air bubbles cease to appear.
6. Install pump belt over pulley.
7. Tension belt as outlined under "Pump Belt Tension—Adjustment" in this section.
8. Bleed as outlined under "Maintenance and Adjustments."

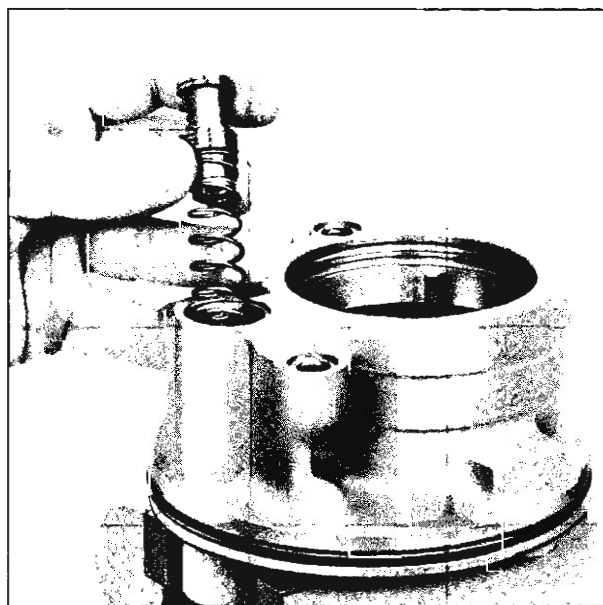


Fig. 76—Installing Flow Control Valve

POWER STEERING PUMP TROUBLE SHOOTING

1. PUMP NOISE

CAUSE	REMEDY
a. Loose Belt	Tighten Belt
b. Hoses Touching Other Parts of Car	Adjust Hose Positions
c. Low Oil Level	Fill Reservoir and Bleed as Outlined under "Maintenance and Adjustments"
d. Air in the Oil	Locate Source of Air Leak and Correct
e. Excessive Back Pressure Caused by Hoses or Control Valve	Locate Restriction and Correct
f. Scored Pressure Plate, Thrust Plate, and Rotor	Lap Away Light Scoring. Replace Heavily Scored Part
g. Vanes Not Installed Properly	Install Properly
h. Vanes Sticking in Rotor Slots	Free Up by Removing Burrs or Dirt
j. Extreme Wear of Pump Ring	Replace Part
k. Defective Flow Control Plunger	Replace
l. Burr on Valve Hole and Supercharge Hole Inter Section	Remove Burrs

2. PUMP LEAKS

LOCATION	CAUSE	REMEDY
a. Top of Reservoir	Reservoir Too Full Air in the Oil Housing Welch Plug Loose or Missing	Fill to Proper Level Locate Source of Air Leak and Correct Install New Welch Plug
b. At Reservoir	O-Ring Cut O-Ring Improperly Installed	Replace O-Ring Install Properly
c. At Pressure Fitting on Control Valve, Cylinder or Pump, or at Studs at Rear of Pump	Not Tightened Sufficiently; Cross Threaded or Damaged Seat Defective Seat on Hose End Damaged Seals	Torque to 20 Foot-Pounds Replace Damaged Part Replace Hose Replace Seals
d. At the Shaft Seal	Defective Seal Damaged Shaft	Replace Seal without Disassembling Any Other Part of the Pump Replace Shaft
e. Leaks in the Casting Body		Replace Defective Part
f. Leak at Cylinder Rod Seal		Replace Seal
g. Leak at Control Valve		Replace Seals

3. POOR, OR NO ASSIST OR PUMP INOPERATIVE

CAUSE	REMEDY
a. Loose Drive Belt	Tighten Belt
b. Loose or Defective Drive Pulley	Tighten or Replace
c. Low Oil Level	Fill Reservoir and Bleed
d. Air in the Oil	Locate Source of Air Leak and Correct
e. Defective Hoses	Replace
f. Flow Control or Relief Valve Stuck	Replace Valve
g. Loose Screw in End of Flow Control Valve	Tighten
h. Pressure Plate Not Seated	Seat the Plate
i. Pressure Plate, Thrust Plate or Ring Scored	Replace Using New "O" Rings
j. Extreme Wear of Pump Ring	Replace Part
k. Vanes Not Installed Properly	Install Properly
l. Vanes Sticking in Rotor Slots	Free Up by Removing Burrs or Dirt or Replace
m. Piston Seal Leak	Replace Cylinder
n. Self Steering	Balance Control Valve After Checking Wheel Alignment

CONTROL VALVE

Removal (Fig. 77)

1. Raise the front of the vehicle off the floor and place it on stands.
2. Remove the relay rod to control valve clamp bolt.
3. Disconnect the two pump to control valve hose connections and allow fluid to drain into a container, then disconnect the two remaining valve to power cylinder hoses.
4. Remove the retaining nut from the ball stud to pitman arm connection and disconnect the control valve from the pitman arm.
5. Turn the pitman arm to the right clear of the control valve and unscrew the control valve from the relay rod.
6. Remove the control valve from the vehicle.

Disassembly

1. Place the valve in a vise as shown and remove dust cover (fig. 78).

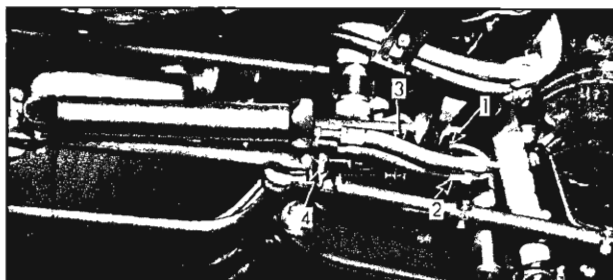


Fig. 77—Control Valve Removal

- | | |
|-------------------------|----------------------------|
| 1. Hydraulic Connection | 3. Ball Stud Retaining Nut |
| 2. Hydraulic Connection | 4. Clamp |

2. Remove adjusting nut (fig. 79).
3. Remove valve to adapter bolts and remove valve housing and spool from adapter.
4. Remove spool from housing (fig. 80).
5. Remove spring, reaction spool, washer, reaction

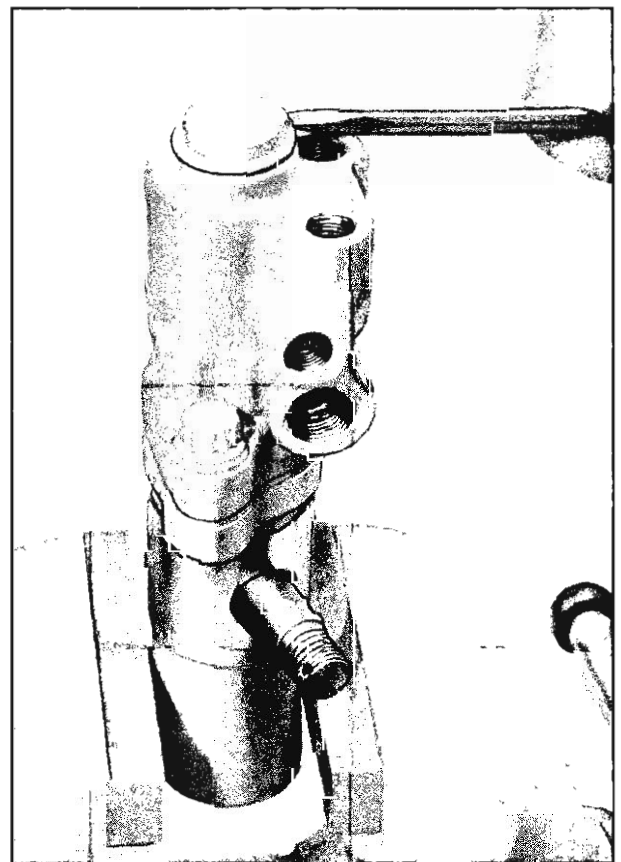


Fig. 78—Dust Cap Removal

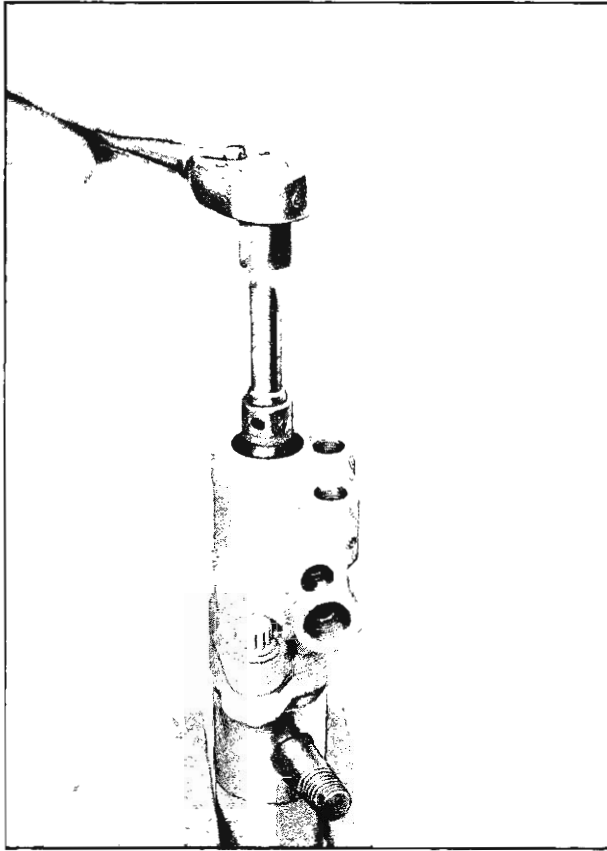


Fig. 79—Removing Lock Nut

spring, spring retainer, and seal (fig. 81). "O" ring may now be removed from the reaction spool.

6. Remove the annulus spacer valve shaft washer and plug to sleeve key (see fig. 82).
7. Carefully, so as not to nick the top surface, turn adjuster plug out of sleeve (fig. 83).
8. Remove the adapter from the vise and invert, permitting the spring and one of the two ball seats to fall free.
9. Remove the ball stud and the other ball seat and the sleeve will fall free.

Inspection

1. Wash all metal parts in solvent cleaner and blow dry with compressed air.
2. Inspect all parts for scratches, burrs, distortion, evidence of wear and replace all worn or damaged parts, including mating parts when necessary.
3. Replace all seals, gaskets, covers with approved service parts.

Assembly (Fig. 84)

1. Replace the sleeve and ball seat in the adapter, then the ball stud, and finally the other ball seat and the spring, small coil down.
2. Clamp the adapter in vise, put the shaft through the seat in the adjuster plug and screw adjuster plug in sleeve (fig. 85).
3. Turn the plug in until it is tight, then back it off

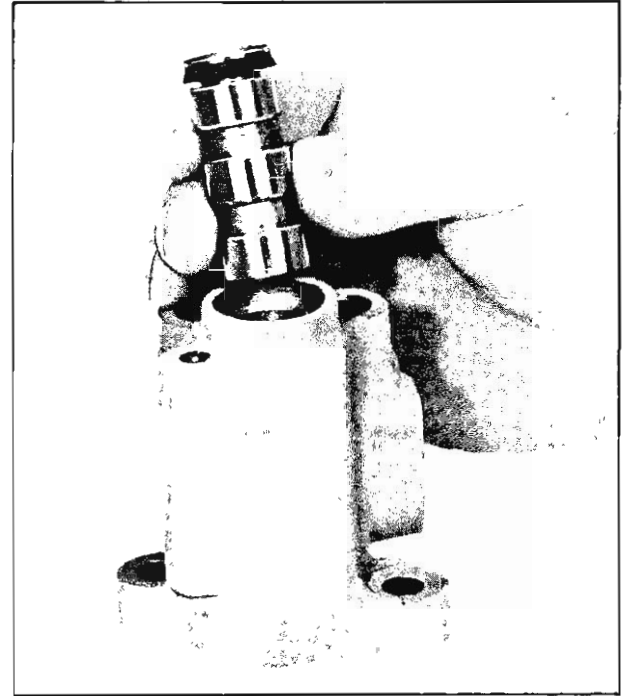


Fig. 80—Removing Spool from Housing

until the slot lines up with notches in the sleeve.

4. Insert the key, making sure that the small tangs on the ends of the key fit into the notches in the sleeve (fig. 86).

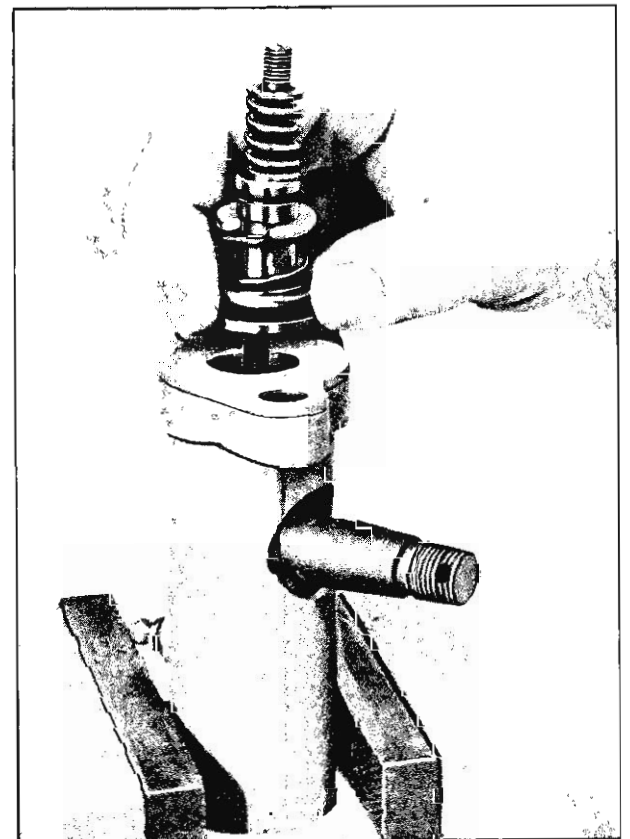


Fig. 81—Removing Valve Parts from Shaft

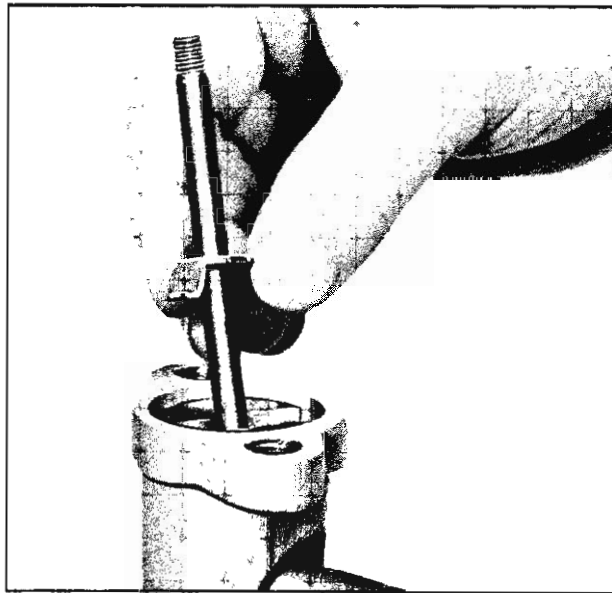


Fig. 82—Removing Plug-To-Sleeve Key

5. Install the valve shaft washer, annulus spacer, and the reaction seal (lip up), spring retainer, reaction spring and spool, washer and adjustment spring. (Install "O" ring seal on reaction spool before installing spool on shaft.) Install the washer with the chamfer "up."
6. Install the seal on the valve spool (lip down), then install spool in housing (fig. 80) being careful not to jam spool in housing
7. Install housing and spool onto adapter. The side

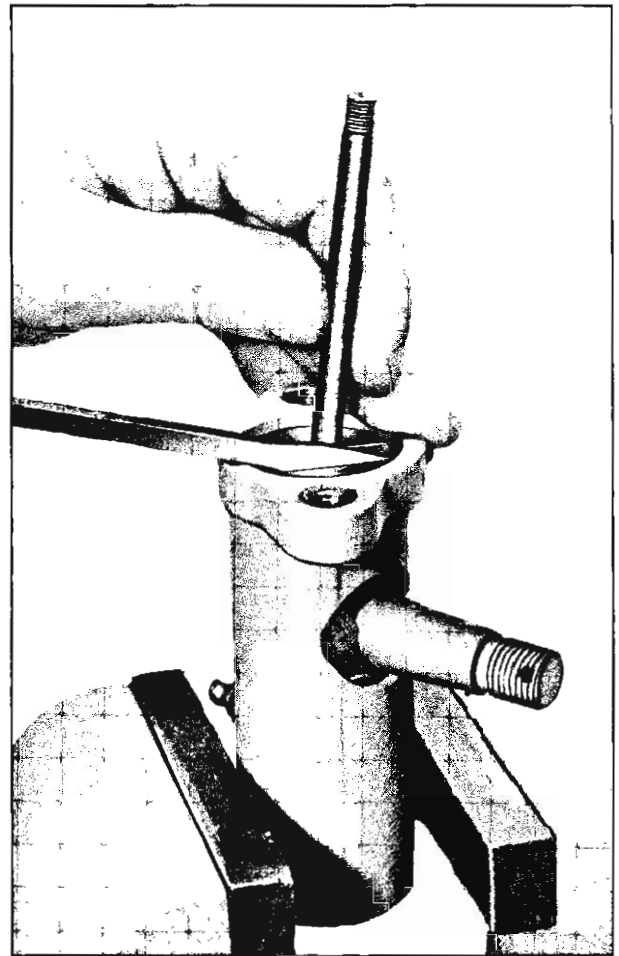


Fig. 83—Turning Adjuster Plug out of Sleeve

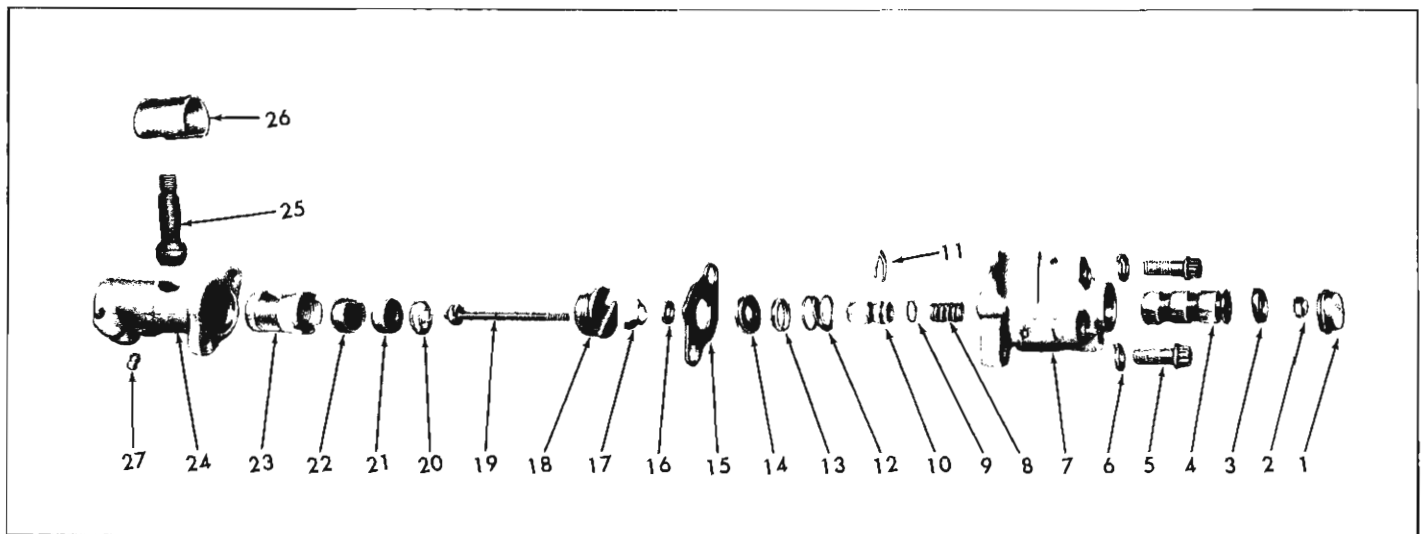


Fig. 84—Exploded View of Valve

- | | | | |
|-------------------------|----------------------------|------------------------|-------------------------|
| 1. Dust Cover | 8. Valve Adjustment Spring | 15. Annulus Spacer | 22. Ball Seat |
| 2. Adjusting Nut | 9. "O" Ring Seal | 16. Valve Shaft Washer | 23. Sleeve Bearing |
| 3. Vee Black Seal | 10. Valve Reaction Spool | 17. Plug to Sleeve Key | 24. Adapter Housing |
| 4. Valve Spool | 11. Spring Thrust Washer | 18. Ball Adjuster Nut | 25. Ball Stud |
| 5. Valve Mounting Bolts | 12. Valve Spring | 19. Valve Shaft | 26. Dust Shield |
| 6. Lock Washer | 13. Spring Retainer | 20. Ball Seat Spring | 27. Lubrication Fitting |
| 7. Valve Housing | 14. Annulus Seal | 21. Ball Seat | |

ports should be on the same side as the ball stud. Bolt the housing to the adapter.

8. Depress the valve spool and turn the lock nut onto the shaft about four turns with a clean wrench or socket. Use a new special nut.

NOTE: Always use a new nut.

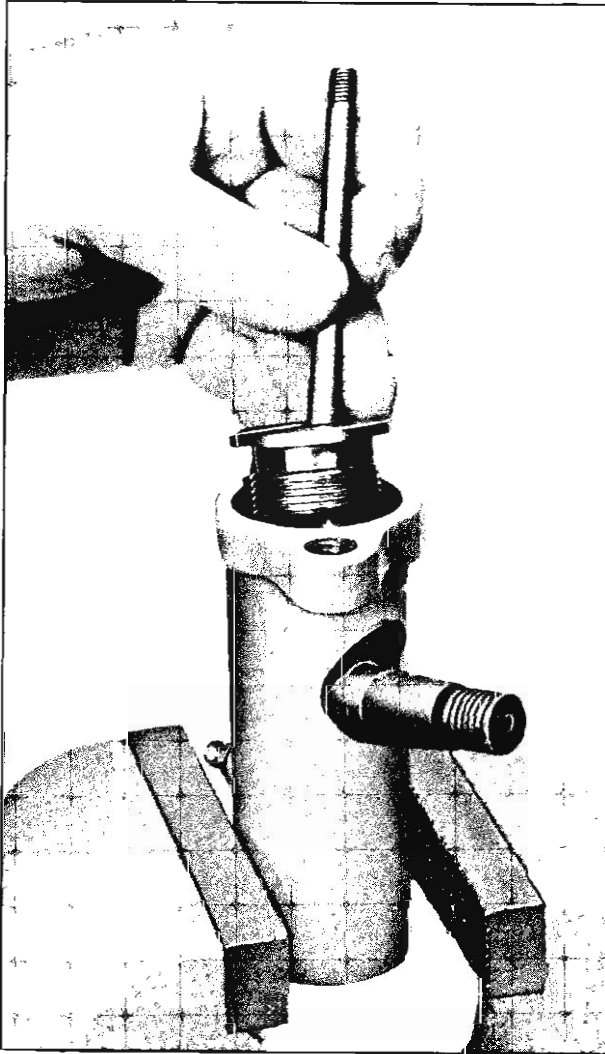


Fig. 85—Replacing Adjuster Plug and Shaft

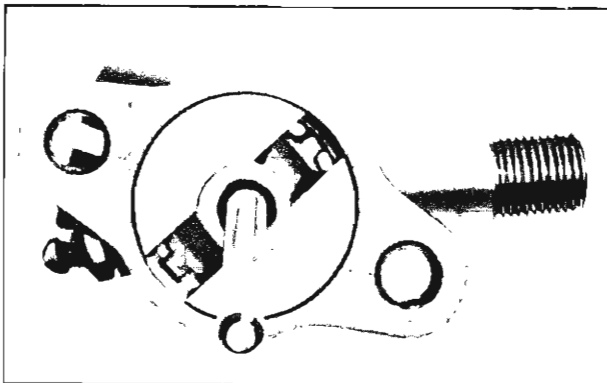


Fig. 86—Proper Key Installation

Installation

1. Install the control valve on the relay rod so that the control valve bottoms, then back off enough (if necessary) to install clamping bolt. Do not exceed one full turn of the valve. There will be approximately $\frac{1}{16}$ " to $\frac{1}{8}$ " gap.
2. Tighten the control valve clamping bolt and assemble ball stud to pitman arm.
3. Reconnect the four hydraulic hoses to the control valve.
4. Fill the system with type "A" fluid, bleed out air using the procedure outlined under "Maintenance and Adjustments" and grease the valve. Before replacing the dust cap the valve must be balanced as described in the following paragraphs.

Valve Balancing

The control valve must be adjusted, after being disassembled, as outlined in the following procedure. The same procedure may be followed to correct a complaint of harder steering effort required in one direction than the other. See Figure 87.

1. Install valve in vehicle. Connect all hoses and fill the pump reservoir with oil. Do not connect the piston rod to the frame bracket. If the vehicle is already in operation, it will be necessary to detach the piston rod from the frame bracket.
2. With the car on a hoist, start the engine. One of the following two conditions will exist:
 - a. If the piston rod remains retracted, turn the adjusting nut clockwise until the rod begins to move out.

Then turn the nut counterclockwise until the rod just begins to move in. Now turn the nut clockwise to exactly one-half the rotation needed to change the direction of the piston rod movement.

If the rod extends upon starting the pump, move the nut counterclockwise until the rod

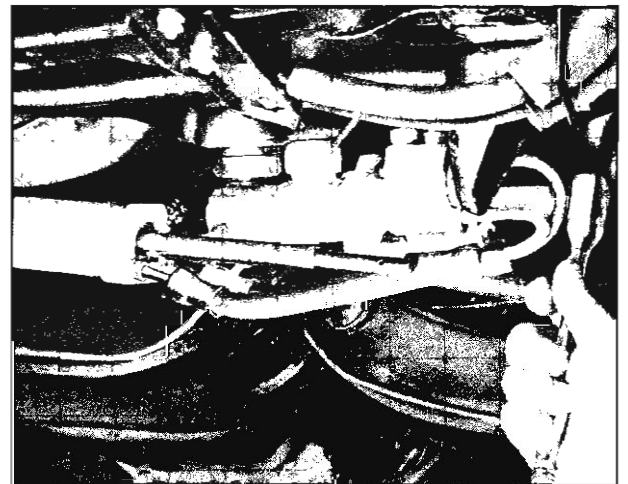


Fig. 87—Balancing Valve

begins to retract, then clockwise until the rod begins to move out again. Now position the rod to exactly one-half the rotation needed to change the direction of the piston rod movement.

CAUTION: Do not turn the nut back and forth more than is absolutely necessary to balance the valve, as this is a special friction nut.

3. With the valve balanced, it should be possible to move the rod in and out manually.
4. Turn off the engine and connect the cylinder rod to the frame bracket.
5. Restart the engine. If the front wheels (still on the hoist) do not turn in either direction from center the valve has been properly balanced. Correct the valve adjustment if necessary.

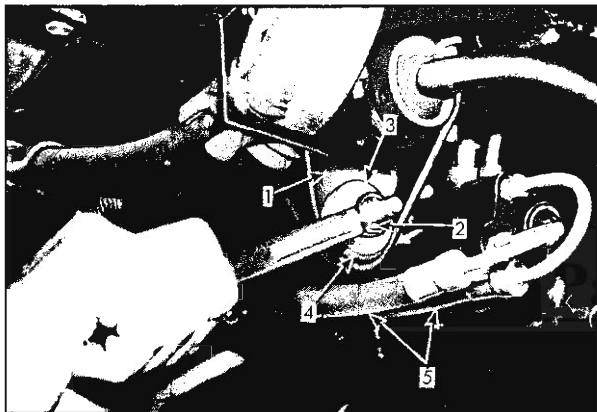


Fig. 88—Power Cylinder Installation

- | | |
|------------|--------------------|
| 1. Bracket | 4. Grommet |
| 2. Nut | 5. Hydraulic Hoses |
| 3. Washer | |

6. When the valve is properly adjusted, grease end of valve and install the dust cap.

POWER CYLINDER

Removal

1. Disconnect the two hydraulic lines (5) (fig. 88) connected to the power cylinder and drain fluid into a container. Do not reuse.
2. Remove retaining nut, washer, and rubber grommet from power cylinder rod to the bracket attached to the frame.
3. Remove the cotter pin, retaining nut, and pull stud out of relay rod.
4. Remove the power cylinder from the vehicle.

Inspection

1. Inspect the seals for leaks around the cylinder rod and if leaks are present replace the seals, using the procedure outlined under "Disassembly."
2. Examine the brass fitted hose connection seats for cracks or damage and replace if necessary.
3. For service other than seat or seal replacement and ball stud removal, replace the power cylinder.
4. It is possible to remove the ball stud from power cylinder by removing snap ring and removing ball stud assembly.

Disassembly

(See Figure 89)

1. To remove the piston rod seal, remove the snap ring then pull out on the rod, being careful not to spray oil out of the parts. Now, remove the piston rod scraper and scraper element, backup washer and piston rod seal from the rod.

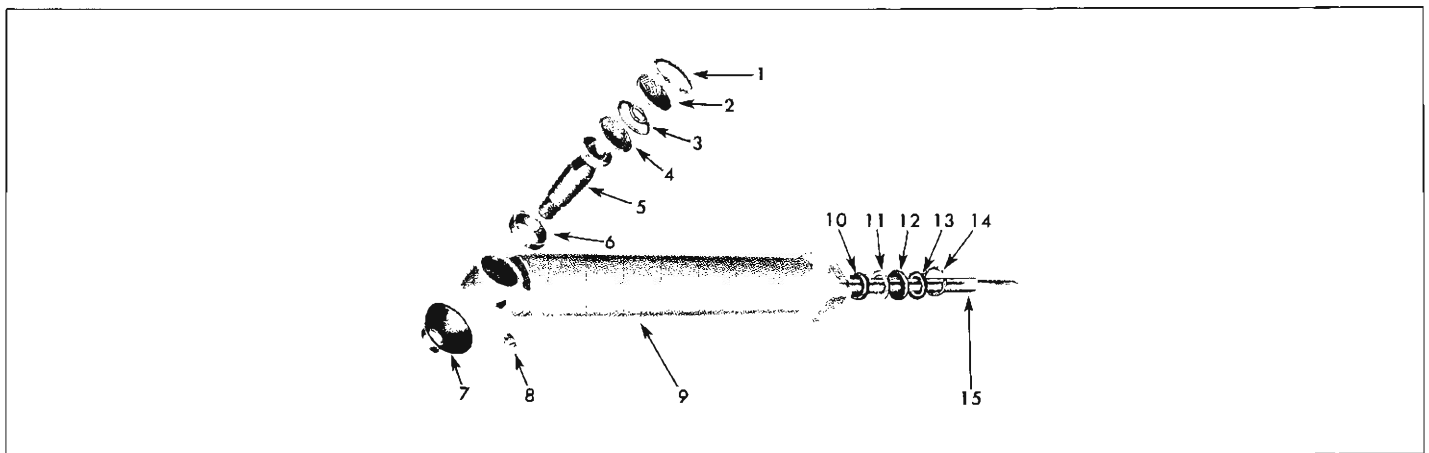


Fig. 89—Exploded View of Power Cylinder

- | | | | |
|----------------|---------------------|---------------------|------------------------|
| 1. Snap Ring | 5. Ball Stud | 9. Piston Body | 13. Piston Rod Scraper |
| 2. End Plug | 6. Ball Seat | 10. Piston Rod Seal | 14. Snap Ring |
| 3. Spring | 7. Ball Stud Shield | 11. Backup Washer | 15. Piston Rod |
| 4. Spring Seat | 8. Lube Fitting | 12. Scraper Element | |

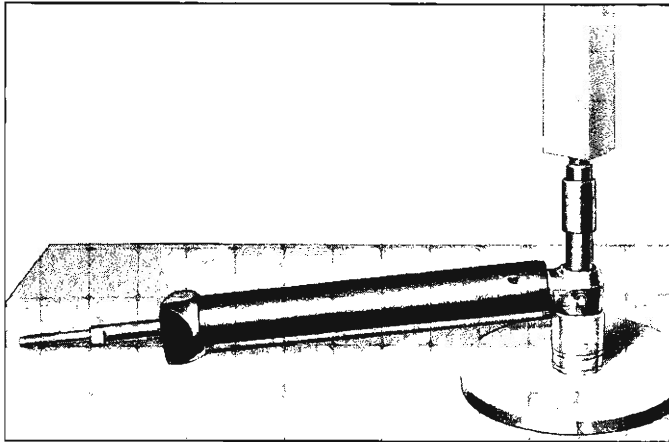


Fig. 90—Removing Ball Cup

2. To remove the ball stud, depress the end plug and remove the snap ring. Push on the end of the ball stud and the end plug, spring, spring seat and ball stud may be removed. If the ball seat is to be replaced it must be pressed out, using Tool J-8937 (figs. 90 and 91).

Assembly

1. Reassemble the piston rod seal components by reversing the disassembly procedure. Apply a thin coating of lubriplate on the inner surfaces of the seal and scraper element before assembly.
2. Reverse the disassembly procedure when reassembling the ball stud. Fill the area beneath the end plug with G. M. 4618-M grease.
3. In each case, be sure that the snap ring is securely seated in the ring groove.

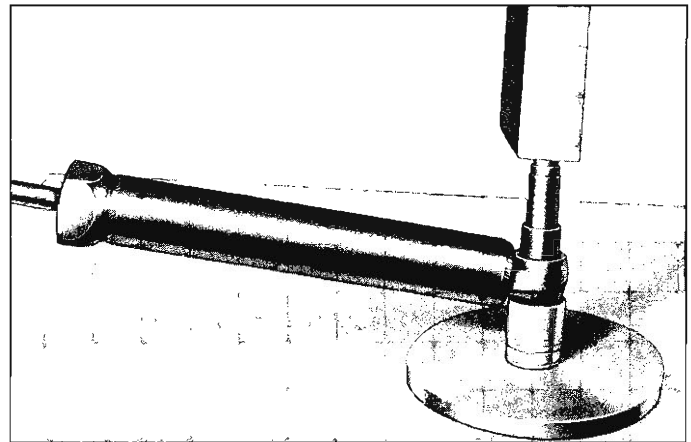


Fig. 91—Installing Ball Cup

Installation

1. Install the power cylinder on the vehicle by reversing the removal procedure.
2. Reconnect the two hydraulic lines, fill the system with fluid and bleed out air using the procedure outlined under "Maintenance and Adjustments." Grease ball joint.

This section will cover only those causes of trouble which may be due to the hydraulic power steering mechanism. Before assuming that the hydraulic power mechanism is at fault, make sure the mechanical components are in good condition. The mechanical items include: front wheel alignment, tire condition and pressure, wheel bearing adjustment, lubrication and adjustment of steering linkage, and proper alignment of steering gear in mounting to eliminate bindings, and steering gear adjustment.

TROUBLES AND REMEDIES

(POWER STEERING)

1. Hard Steering

To determine whether hard steering actually exists, place car on a clean, dry floor, apply brakes, and with engine idling, turn wheel to the extreme right and left and hold against the stop momentarily in each direction several times. This will bring the oil temperature to approximately 170°F which is operating temperature. Apply Tool J-5178 (15 lbs.) to a spoke at rim of steering wheel and check the pull required to turn the wheel steadily with gauge held at 90 degrees to the spoke. If the pull required to turn the wheel exceeds 10 pounds, check the following causes.

Possible Causes.

- a. Pump drive belt or pulley loose.
- b. Low oil level in reservoir.

- c. Air in hydraulic system.
- d. Insufficient oil pressure.
- e. Steering adjustment tight.

2. Excessive Play or Looseness in Steering Mechanism

Possible Causes

- a. Loose worm thrust bearing adjustment.

3. Low Oil Pressure

If it is believed oil pressure is low, the pressure should be checked as outlined in "Maintenance and Adjustments" using Tool J-5176.

Possible Causes

- a. Generator drive belt loose.

POWER STEERING 4-38

- b. Low oil level in reservoir.
- c. Pump mechanical difficulty—possibly caused by:
 - (1) Relief valve; improper adjustment, weak relief valve spring or relief valve stuck open.
 - (2) Control valve stuck or broken flow control spring.
 - (3) Worn rotor parts.
- d. Pressure loss in steering control valve, possibly caused by sticking valve spool or discharge valve stuck open.
- e. Pressure loss in power cylinder, possibly caused by leaking seal.
- f. External or internal oil leaks.

4. Poor Centering or Recovery on Turns

Possible Causes

- a. Valve spool sticking in valve housing.
- b. Binding of steering shaft.
- c. Loose or tight worm thrust bearing adjustment.
- d. Sticky cylinder assembly.

5. Oil Pump Noisy

Possible Causes

- a. Improper oil level.
- b. Air in system.
- c. Reservoir air vent plugged.
- d. Sludge or dirt in pump.
- e. Pump bearings, shaft, vanes or other rotating parts worn or damaged. Sticking pump vanes also a possibility.

6. Oil Leaks

External—Possible Causes

- a. Loose connections at hose unions or hose fittings.
- b. Loose connection or faulty “O” rings in pump.
- c. Hose leaks.

Internal—Possible Causes

- a. Leaking housing.
- b. Cylinder seal leaking.

SPECIFICATIONS

For Power Steering Specifications, See Section 16.

SPECIAL TOOLS

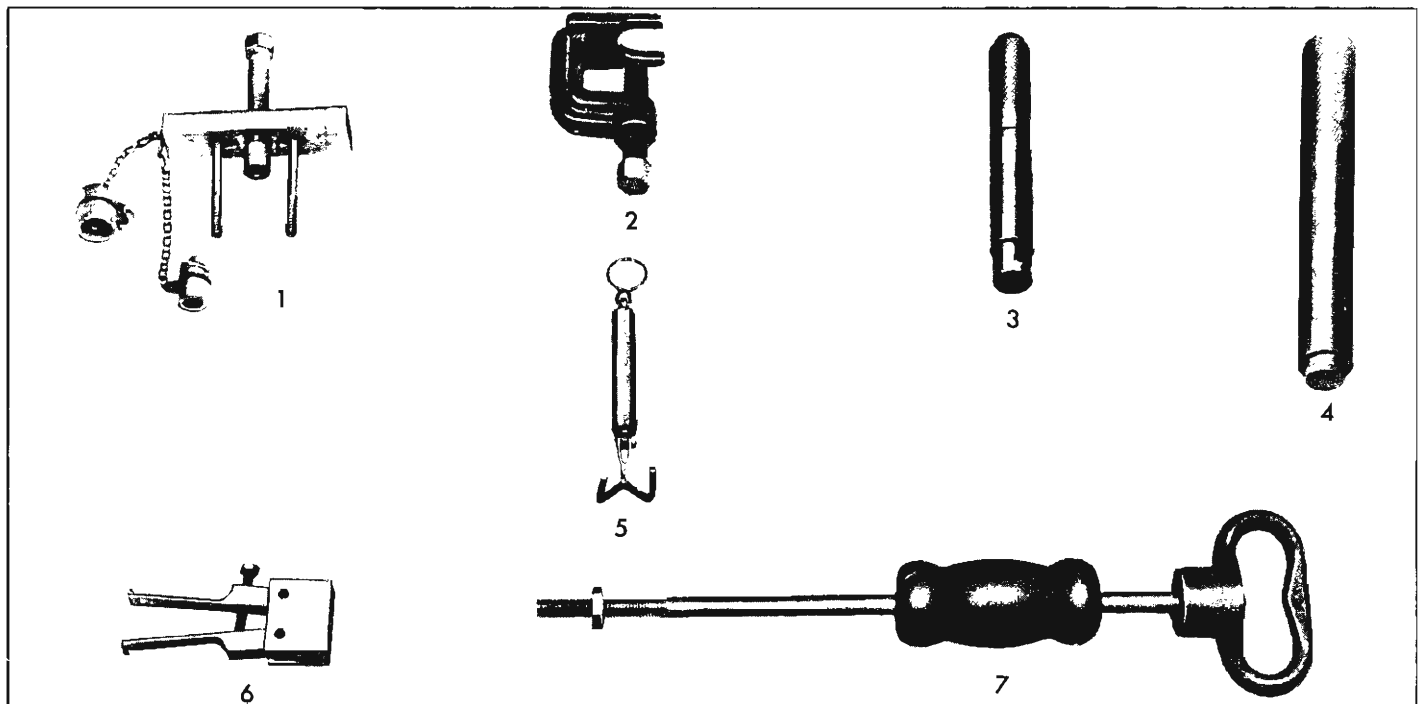


Fig. 4-92—Special Tools—Standard Steering

- | | | | |
|-------------|---|-------------|--------------------------------------|
| 1. J-2927-A | Steering Wheel Puller | 4. J-5755 | Steering Shaft Bearing Cup Installer |
| 2. J-5504 | or
Pitman Arm Puller | 5. J-0544 | Steering Gear Checking Scale |
| J-6632 | | 6. J-5822 | Wormshaft Bearing Cup Remover |
| 3. J-1614 | Pitman Shaft Bushing Remover and Replacer | 7. J-2619-B | (J-2654) Slide Hammer |

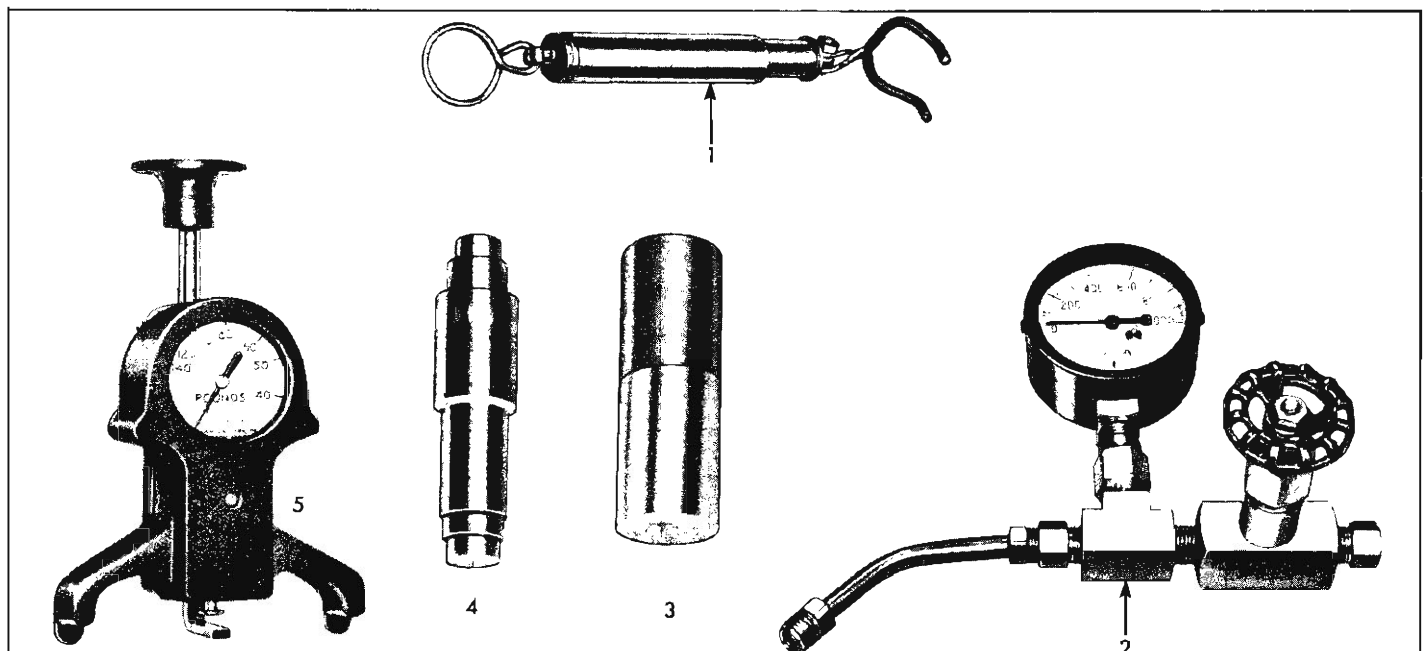


Fig. 93—Special Tools—Power Steering

- | | | | |
|--------------------------------|-----------------------------------|-------------------------------------|-----------------------------------|
| 1. J-5178—Lash Adjusting Gauge | 2. J-5176—Pressure Checking Gauge | 3. J-8818—Pump Shaft Seal Installer | 4. J-8937—Ball Stud Seat Replacer |
| 5. J-7316—Belt Tension Tool | | | |